breakout ABSTRACT

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TITLE

Linking Data from a Population-Based Survey and Ambient Monitors to Identify Geographic Patterns of Asthma Exacerbations and Air Pollutants

THEME

Advance Environmental Public Health Science and Research

KEYWORDS

air pollution, epidemiology, uncontrolled asthma, California, population-based survey

BACKGROUND

According to the 2001 California Health Interview Survey (CHIS), 11.9% of Californians (3.9 million) have been diagnosed with asthma at some point in their lives. As part of the new national initiative on environmental public health tracking, we are developing a model that links health effect data from a population-based survey to air pollution data from ambient monitors to identify geographic patterns of chronic disease and environmental hazards.

OBJECTIVE(S)

As part of the new national initiative on environmental public health tracking led by the Centers for Disease Control and Prevention (CDC), we are developing a model surveillance system that links asthma outcome data from CHIS 2001 with air pollution data from ambient monitors to identify geographic patterns of air pollution and asthma symptoms.

METHOD(S)

Using U.S. Census 2000 population densities at the block level, we identified the population-weighted centroid of each zip code for California Health Interview Survey (CHIS) respondents diagnosed with asthma. The population studied was 5,275 Californians, who reported that they had been diagnosed with asthma, including 1,961 from the San Francisco Bay Area, 1,502 from San Joaquin Valley, and 1,802 from Los Angeles County. These centroids were linked to the nearest monitoring station within a 5-mile radius. We then estimated the annual ambient ozone and fine particulate matter ($PM_{2.5}$) concentrations for each respondent. We estimated the effects of increases in annual ambient ozone and fine particulate matter ($PM_{2.5}$) levels on uncontrolled asthma in the San Francisco Bay Area, San Joaquin Valley, and Los Angeles County regions. Uncontrolled asthma was defined as having daily or weekly symptoms or an asthma-related emergency room visit or hospitalization within the previous year. We used logistic regression to estimate the effects of increases in annual ambient ozone (per part per hundred million) and $PM_{2.5}$ (per 10 $\mu g/m^3$) concentrations on uncontrolled asthma in the San Francisco Bay Area, San Joaquin Valley, and Los Angeles County regions of California.

RESULT(S)

Adjusting for age, gender, race/ethnicity, poverty level, and health insurance status, we observed an increase in the prevalence of uncontrolled asthma associated with ambient ozone levels in all three regions (pooled odds ratio (OR): 1.33; 95% confidence interval (CI): 1.15, 1.55). For elevated ambient $PM_{2.5}$ level, we observed an increase of uncontrolled

asthma only for those residing in the San Joaquin Valley (OR: 1.68; 95% CI: 1.08, 2.59). The regional heterogeneity of the $PM_{2.5}$ effect estimates may be related to variations in the characteristics of $PM_{2.5}$.

DISCUSSION/RECOMMENDATION(S)

These findings contribute to our understanding of the role of air pollutants on the control of asthma after adjusting for individual-level socioeconomic status and access to care in different regions of California. The linkage of CHIS health data with air quality monitoring data provides a potential model for environmental public health tracking in other states.

The availability of these data will enable researchers and health authorities to begin to understand the possible associations between the environment and adverse health effects and to ultimately inform policies that encourage reductions in air pollution.

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AUTHOR(S)

Ying-Ying Meng, Dr.P.H.
Senior Research Scientist
UCLA Center for Health Policy Research
10911 Weyburn Avenue, Suite 300
Los Angeles, CA 90024
310-794-2931
yymeng@ucla.edu

Rudolph P. Rull
Beate Ritz
Michelle Wilhelm
Marlena Kane